

COST Action EuMINE - European Materials Informatics Network

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1. Introduction

COST (European Cooperation in Science and Technology)[1] actions play a pivotal role in fostering collaboration, innovation, and excellence across Europe's scientific landscape. With a focus on promoting pan-European networking, COST actions bring together researchers, policymakers, industry stakeholders, and other relevant actors to address pressing societal challenges, drive scientific advancement, and stimulate economic growth. By facilitating interdisciplinary collaboration and knowledge exchange, COST actions leverage Europe's rich diversity of expertise and resources to tackle complex issues spanning diverse fields such as health, environment, technology, and social sciences. Moreover, COST actions serve as catalysts for capacity building, training, and mobility, empowering researchers at all career stages to expand their networks, acquire new skills, and contribute to cutting-edge research initiatives. Through its decentralized, bottom-up approach, COST fosters inclusivity, diversity, and transparency, ensuring that all voices are heard and all regions of Europe are represented in shaping the future of science and innovation. As Europe's longest-running intergovernmental framework for cooperation in science and technology, COST continues to be a driving force for scientific excellence, collaboration, and impact, reinforcing Europe's position as a global leader in research and innovation.

The European Materials Informatics Network (EuMINE, COST Action CA22143)[2] has recently been launched in the framework of the COST programme 2023-2027.[3] EuMINE is a collaborative initiative aimed at revolutionizing the design, development and engineering of advanced materials through the integration of advanced modelling, data-driven and AI technologies. With the overarching goal of enhancing the competitiveness of the European research and development (R&D) landscape, EuMINE brings together a diverse community of experts, researchers, and industry stakeholders to address the multifaceted challenges and opportunities in materials development.

2. The EuMINE approach

The development of advanced materials plays a pivotal role in driving technological advancements across various sectors, including energy, healthcare, transportation, and environmental sustainability. However, the traditional empirical methods for materials discovery and design are often time-consuming, costly, and limited by the vastness of the materials space. In response to these challenges, EuMINE advocates for a paradigm shift towards a fully digital and data-centric approach, leveraging the power of

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computational modelling, artificial intelligence (AI), machine learning (ML), and high-performance computing (HPC) to accelerate the pace of materials innovation.

EuMINE's activities are guided by several key objectives:

- Collaborative research coordination: EuMINE serves as a platform for fostering collaboration among researchers and institutions working on materials informatics. By promoting knowledge sharing, resource exchange, and interdisciplinary collaboration, EuMINE aims to accelerate the development and adoption of modelling and data-driven methods for materials discovery, characterization, and design.
- Standardization and methodology development: one of EuMINE's primary objectives is to develop shared standards, practices, and methodologies for the application of materials informatics and AI for advanced materials development. Through collaborative efforts, the network aims to harmonize best practices in data management, model validation, and predictive modelling, ensuring interoperability and reproducibility across diverse research domains.
- Infrastructure and tools development: EuMINE advocates for the development of robust infrastructure and tools to support the adoption of digital and data-driven approaches for advanced materials. This includes the use of high-performance computing resources, data repositories, and software platforms tailored to the needs of materials researchers and practitioners.
- Technology transfer and innovation: EuMINE facilitates technology transfer and innovation by fostering collaboration between academia and industry. By bridging the gap between fundamental research and real-world applications, EuMINE aims to accelerate the translation of research findings into commercial products, processes, and solutions.
- Capacity building and training: EuMINE prioritizes capacity building and training initiatives to empower researchers with the necessary skills and knowledge to leverage digitalisation for advanced materials. Through workshops, seminars, and educational resources, EuMINE seeks to cultivate a new generation of materials informatics experts and practitioners.

3. An open platform for materials informatics in Europe

The EuMINE COST Action realises an open and inclusive approach characteristic of COST actions, with over 150 participants hailing from 35 countries. Embracing the principles of collaborative networking, EuMINE provides a platform for researchers, practitioners, policymakers, and industry experts from across Europe to converge, exchange ideas, and collectively address the multifaceted challenges at the intersection of advanced materials development, digital transition and AI. By fostering a diverse and vibrant community of participants, EuMINE harnesses the collective expertise and perspectives of its members to drive forward innovation, advance knowledge, and boost the field of materials informatics. Through its open character and inclusive nature, EuMINE embodies the spirit of collaboration and cooperation that lies at the heart of COST actions, empowering individuals and institutions to collaborate across borders, disciplines, and sectors to address pressing societal needs and advance the frontiers of science and technology.

4. References

- [1] <https://www.cost.eu/>
- [2] <https://www.eumine-cost.eu>
- [3] <https://www.cost.eu/actions/CA22143/>